

# A pilot investigation of interoceptive accuracy, awareness, and sensibility in functional neurological disorder



L. S. Merritt Millman<sup>a</sup>, Eleanor Short<sup>a</sup>, Biba Stanton<sup>a</sup>, Joel Winston<sup>a</sup>, Timothy Nicholson<sup>a</sup>, Mitul Mehta<sup>a</sup>, Simone Reinders<sup>a</sup>, Mark Edwards<sup>a</sup>, Laura Goldstein<sup>a</sup>, Anthony David<sup>b</sup>, Matthew Hotopf<sup>a</sup>, Trudie Chalder<sup>a</sup>, Susannah Pick<sup>a\*</sup>



<sup>a</sup>Institute of Psychiatry, Psychology, and Neuroscience, King's College London,

<sup>b</sup>University College London Institute of Mental Health



@neuroads\_lab \*susannah.pick@kcl.ac.uk

## Introduction

Altered interoception may be a core pathophysiological mechanism in functional neurological disorder (FND).

However, there have been inconsistent findings from interoceptive accuracy paradigms:

- Several studies report no significant group differences in comparisons to controls when tested at rest/baseline
- Contrary to evidence for alterations in other interoceptive dimensions in this population including awareness and sensibility

## Method

- Individuals with FND (n=17) and healthy controls (HC, n=17) completed measures of interoceptive accuracy, awareness, and sensibility
- Accuracy and confidence assessed using a **heartbeat tracking task** (HTT; Schandry, 1981)
  - Used modified instructions (Desmedt et al., 2020), ECG and examined influence of BMI and previous HR knowledge
  - **Time estimation task** (TET) included as HTT control
- Sensibility assessed with a validated scale of interoceptive sensibility (**Multidimensional Assessment of Interoceptive Awareness-2**; MAIA-2)



**HTT:** Attend to and count their own heartbeats during three randomised intervals

Accuracy calculated as  $1/3 \sum [(1 - (|actual\ seconds - perceived\ seconds|) / actual\ seconds)]$

- After each interval, participants asked to rate confidence in their answer (0-10, low-high certainty)

**TET:** Count seconds during three randomised intervals and rate confidence in their answer (0-10, low-high certainty)

**MAIA-2:** self-report questionnaire assessing sensitivity to bodily sensations and experiences across eight dimensions:

- Noticing, Not-Distracting, Not-Worrying, Attention Regulation, Emotional Awareness, Self-Regulation, Body Listening, Trust

## Conclusions

- Individuals with FND did not differ from HCs on HTT accuracy or confidence.
- Lower "Not-Distracting" & "Trusting" replicated our previous work → may be a separation between trait & state interoception in FND
- Lack of relationship between interoceptive accuracy & confidence in FND group → deficit in metacognitive interoceptive awareness?
- Future work will explore the possibility that interoceptive impairments in FND are state dependent.

## Aim

This study was one component of a larger pilot project. The aim of this particular experiment was to assess the feasibility and utility of measuring interoception in FND and healthy controls across the dimensions of:

- **Accuracy:** objective performance on behavioural tests of heartbeat detection
- **Awareness:** metacognitive evaluation of interoceptive accuracy (correlation b/w accuracy and confidence)
- **Sensibility:** self-reported sensitivity to bodily sensations

We predicted that individuals with FND would show reduced accuracy, awareness, and sensibility compared to controls.

*Secondary aim:* explore how potentially altered interoception is related to a range of relevant clinical characteristics in FND including dissociation, alexithymia, autistic traits, psychological distress, with the prediction that interoceptive ability would be negatively correlated with these characteristics.

## Results

The groups did not differ in age ( $p=.51$ ), gender ( $p=1.00$ ), and BMI ( $p=.19$ ). Significantly more participants in the FND group disclosed a self-reported knowledge of their heartrate ( $p=.01$ ) and were more likely to be taking medication ( $p<.001$ ).

- Individuals with FND did not differ from HCs on:
  - HTT accuracy ( $t(28.45) = .003, p = 1.00, g = .00$ )
  - HTT confidence ( $t(28.16) = .018, p = .99, g = .004$ )

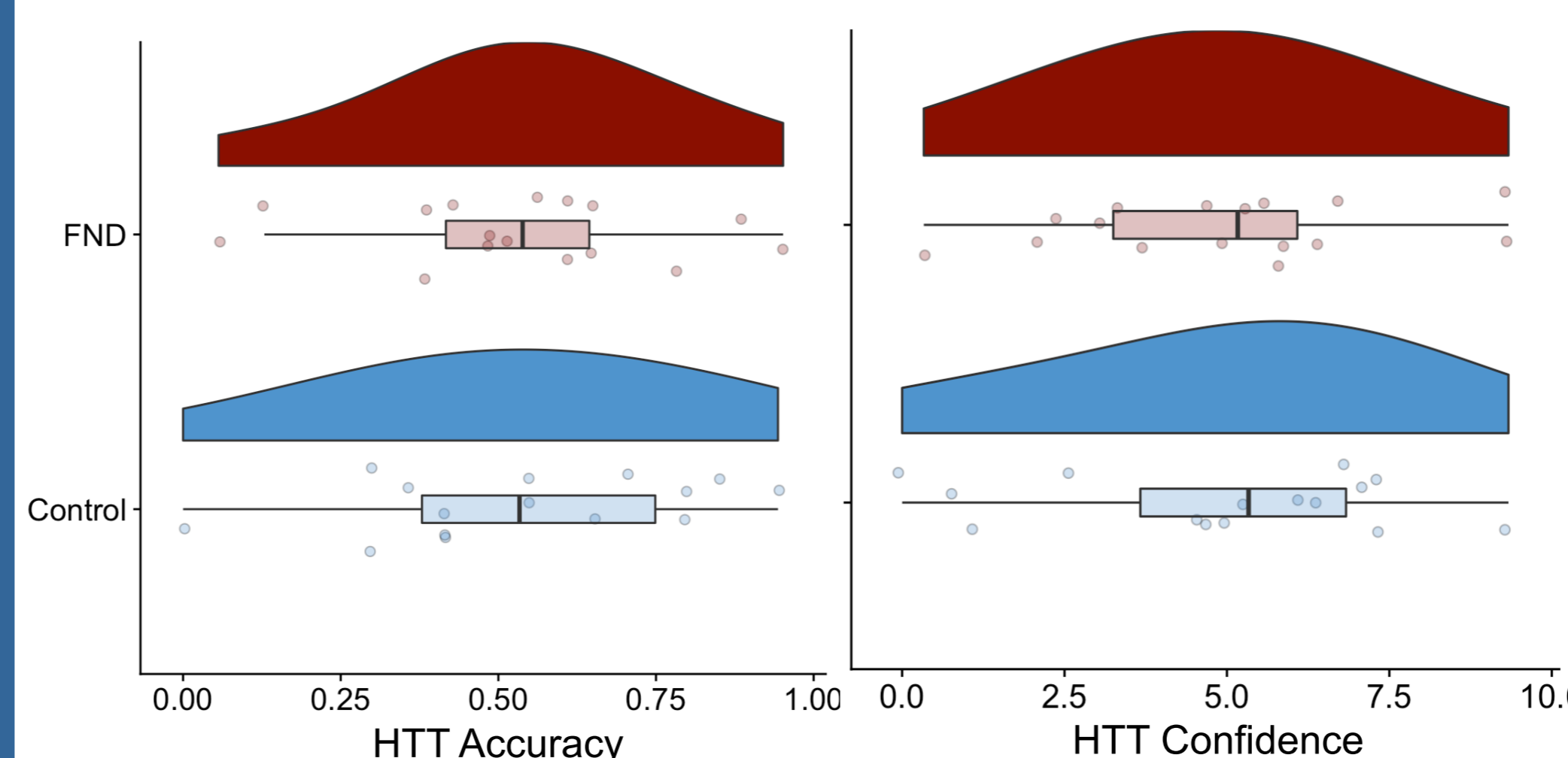


Figure 1. HTT accuracy and confidence as a function of group.

Significant positive relationship between HTT accuracy and confidence in HCs but not in the FND group

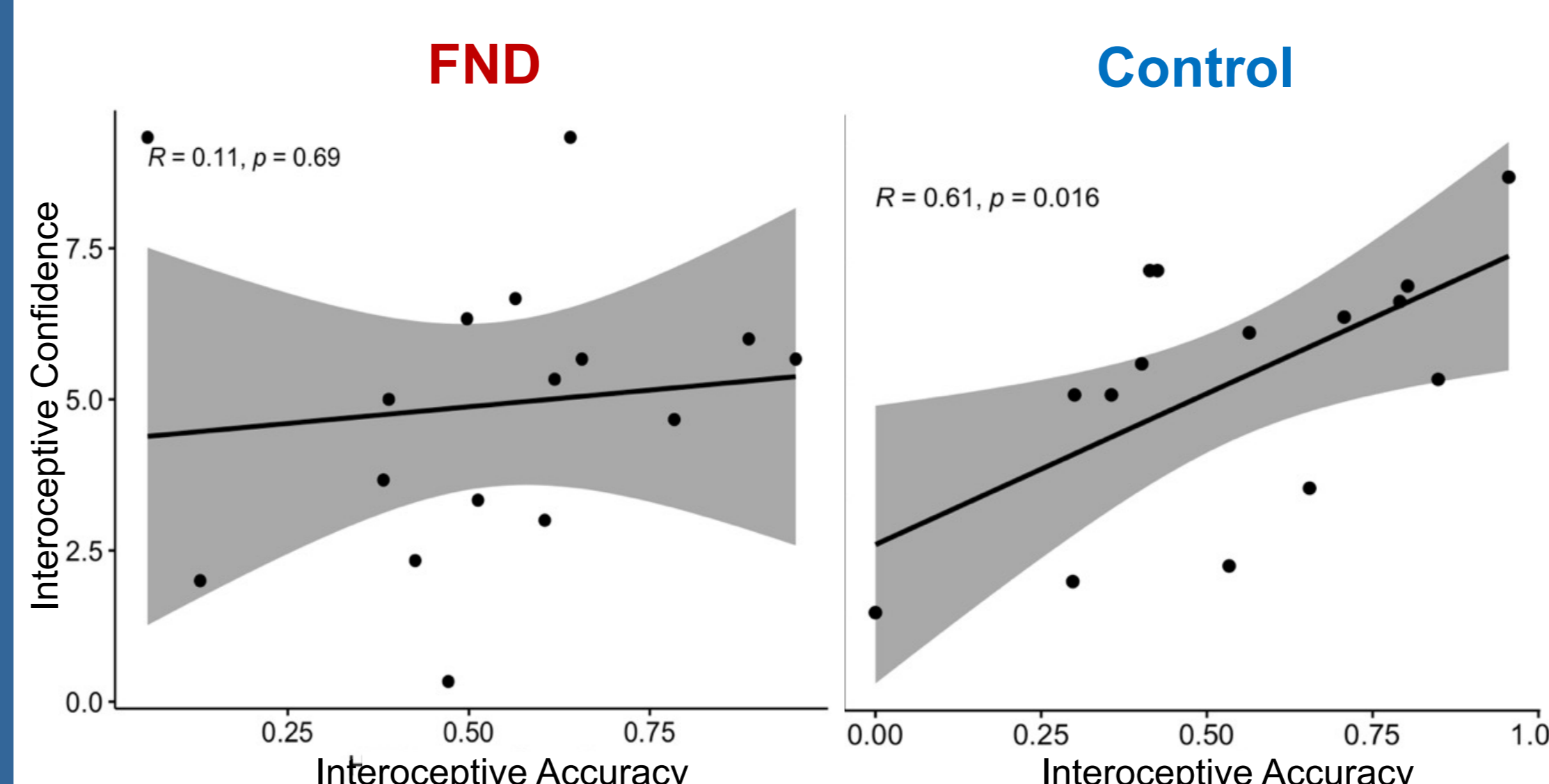


Figure 2. Metacognitive interoceptive awareness.

No association in either group between HTT accuracy and TET accuracy (FND:  $p=.32$ ; HC:  $p=.80$ ) or HTT confidence and TET confidence (FND:  $p=.08$ ; HC:  $p=.34$ )

FND: altered interoceptive sensibility relative to HCs on two dimensions (MAIA-2)

- Lower "Not-Distracting" ( $g=1.42$ )
- Lower "Trusting" ( $g=1.17$ )

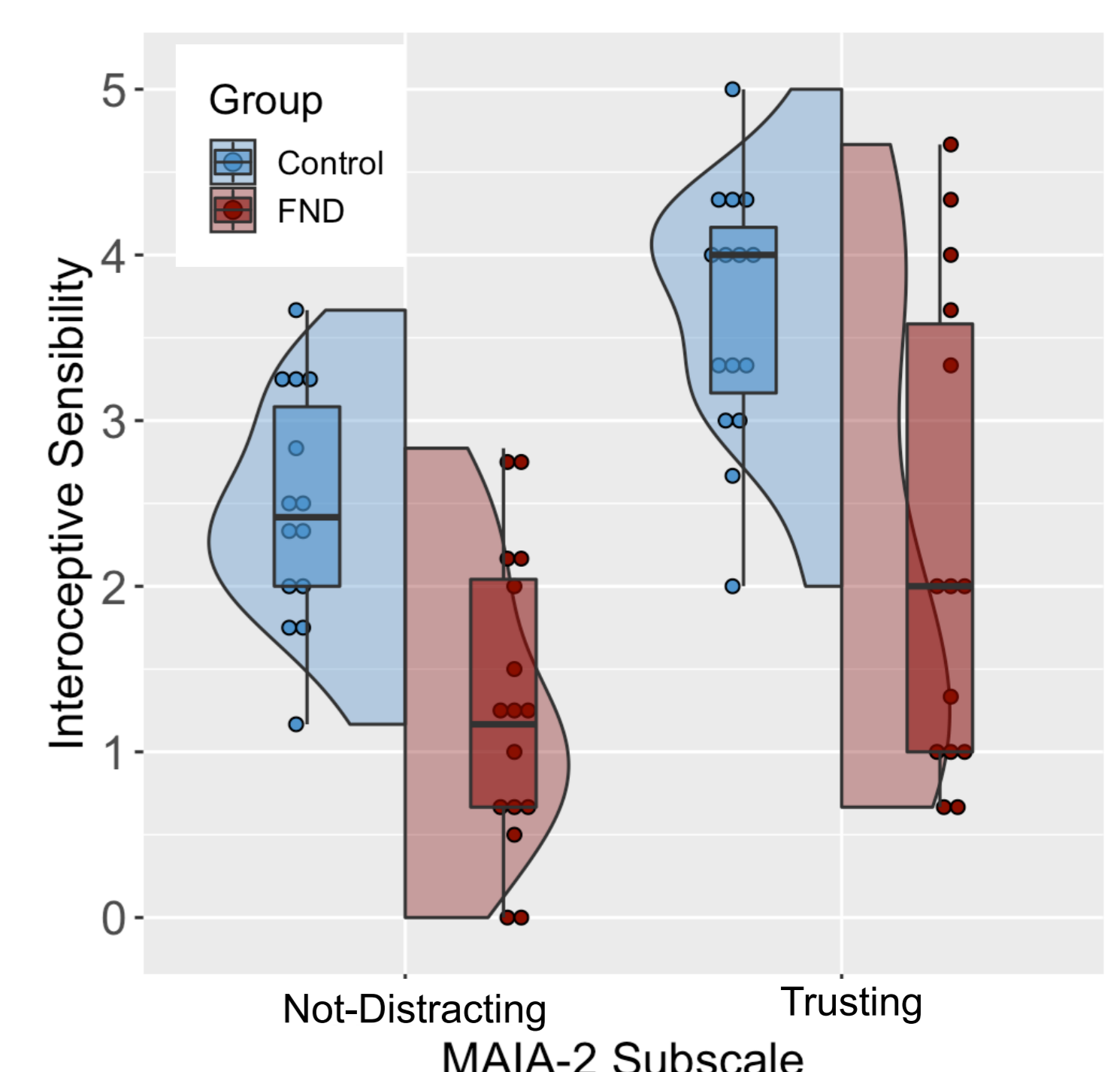


Figure 3. Interoceptive sensibility across "Not-Distracting" and "Trusting."

Nonsignificant correlations between interoception and relevant clinical variables (all  $ps > .06$ ).

## Acknowledgements

The study was funded by the Medical Research Council [MR/V032771/1], King's College London and the NIHR Maudsley Biomedical Research Centre. Thank you to our FND Patient and Carer Advisory Panel, all participants, FND Hope UK and FND Action for supporting the project.

